FIG.1

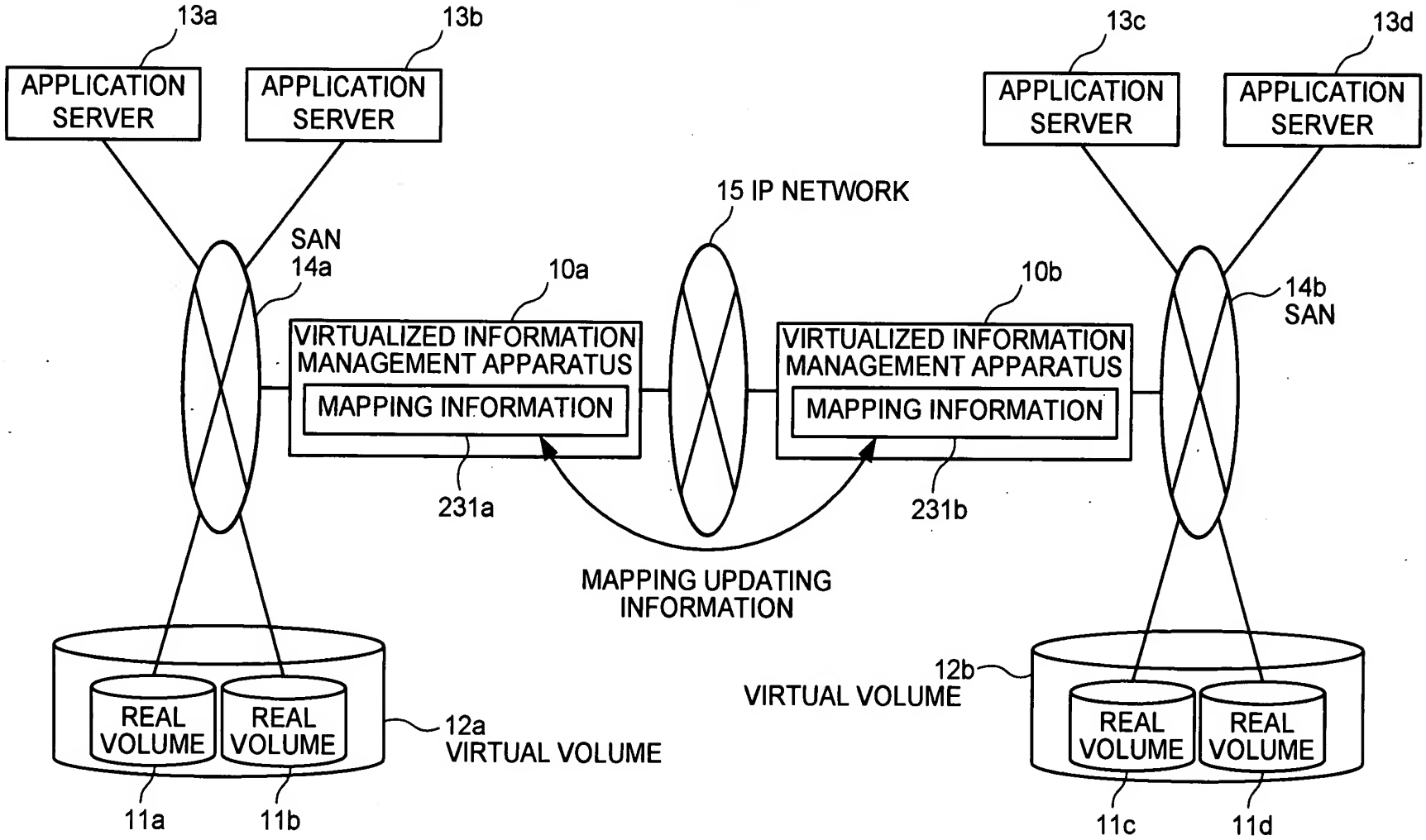

13a
13b
13c
13d
APPLICATION SERVER
APPLICATION SERVER
APPLICATION SERVER
APPLICATION SERVER
15 IP NETWORK
SAN
14a
10a
10b
14b
SAN
VIRTUALIZED INFORMATION MANAGEMENT APPARATUS
MAPPING INFORMATION
VIRTUALIZED INFORMATION MANAGEMENT APPARATUS
MAPPING INFORMATION
231a
231b
MAPPING UPDATING INFORMATION
12b
VIRTUAL VOLUME
REAL VOLUME
REAL VOLUME
12a
VIRTUAL VOLUME
REAL VOLUME
REAL VOLUME
11a
11b
11c
11d

FIG.2

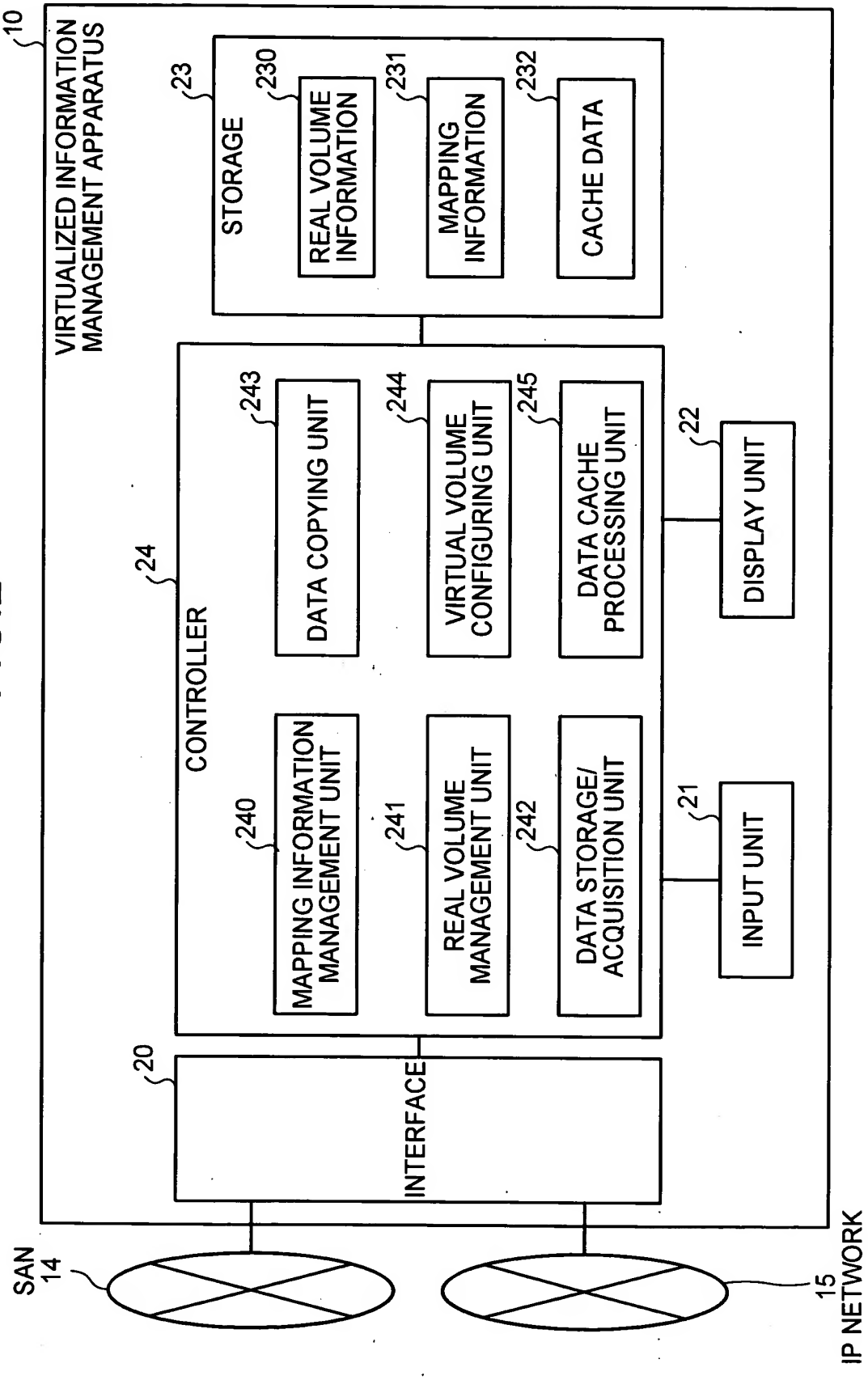

10
VIRTUALIZED INFORMATION MANAGEMENT APPARATUS
23
STORAGE
230
REAL VOLUME INFORMATION
231
MAPPING INFORMATION
232
CACHE DATA
24
CONTROLLER
243
DATA COPYING UNIT
244
VIRTUAL VOLUME CONFIGURING UNIT
245
DATA CACHE PROCESSING UNIT
22
DISPLAY UNIT
240
MAPPING INFORMATION MANAGEMENT UNIT
241
REAL VOLUME MANAGEMENT UNIT
242
DATA STORAGE/ ACQUISITION UNIT
21
INPUT UNIT
20
INTERFACE
SAN
14
15
IP NETWORK

FIG.3A

REAL VOLUME IDENTIFYING INFORMATION

NAME OF VIRTUAL VOLUME	FC ADDRESS OF STORAGE DEVICE	LUN	STORAGE CAPACITY OF REAL VOLUME
VOLUME A	011300	0	60GB
	...	...	...
	021a00	3	120GB
VOLUME B	051c00	8	50GB
	...	...	...
	061f00	10	300GB
...	...	...	...

FIG.3B

REAL VOLUME FREE CAPACITY INFORMTION

FC ADDRESS OF STORAGE DEVICE	TYPE OF REAL VOLUME	FREE CAPACITY OF REAL VOLUME
011300	HIGH-SPEED HDD	40GB
021a10	HIGH-SPEED HDD	30GB
	LOW-SPEED HDD	60GB
051c00	LOW-SPEED HDD	50GB
061f00	TAPE DRIVE	—
...	...	...

FIG.4A

REAL VOLUME IDENTIFYING INFORMATION

NAME OF COMMON VIRTUAL VOLUME	NAME OF VIRTUALIZED INFORMATION MANAGEMENT APPARATUS	IP ADDRESS OF VIRTUALIZED INFORMATION MANAGEMENT APPARATUS	NAME OF VIRTUAL VOLUME IN VIRTUALIZED INFORMATION MANAGEMENT APPARATUS	FREE CAPACITY OF VIRTUAL VOLUME
VOLUME 1	APPARATUS A	123.45.67.8	VOLUME A	150GB
	APPARATUS A	123.45.67.8	VOLUME B	300GB
VOLUME 2	APPARATUS B	98.76.54.32	VOLUME C	200GB
...	...	...	...	...

FIG.4B

VIRTUAL VOLUME SECTOR INFORMATION

NAME OF COMMON VIRTUAL VOLUME	VIRTUAL VOLUME SECTOR	NAME OF VIRTUAL VOLUME IN VIRTUALIZED INFORMATION MANAGEMENT APPARATUS	FC ADDRESS OF STORAGE DEVICE	REAL VOLUME SECTOR
VOLUME 1	1～233,444	VOLUME A	021a00	1～233,444
		VOLUME B	051c00	1～233,444
VOLUME 2	1～362,891	VOLUME C	071900	1～362,891
...	...	...	...	...

FIG.5

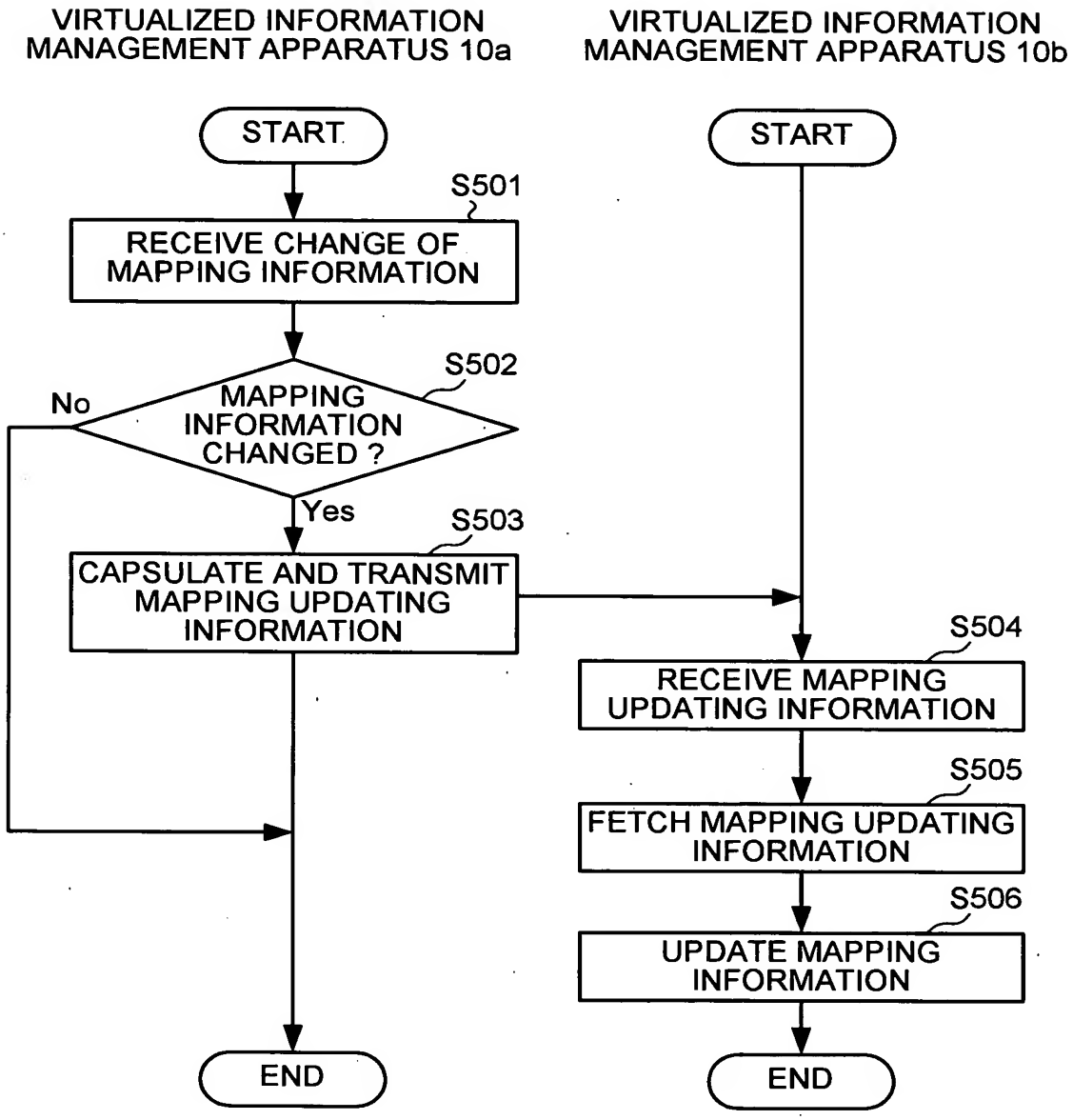

VIRTUALIZED INFORMATION MANAGEMENT APPARATUS 10a
VIRTUALIZED INFORMATION MANAGEMENT APPARATUS 10b
START
START
S501
RECEIVE CHANGE OF MAPPING INFORMATION
S502
MAPPING INFORMATION CHANGED ?
No
Yes
S503
CAPSULATE AND TRANSMIT MAPPING UPDATING INFORMATION
S504
RECEIVE MAPPING UPDATING INFORMATION
S505
FETCH MAPPING UPDATING INFORMATION
S506
UPDATE MAPPING INFORMATION
END
END

FIG.6

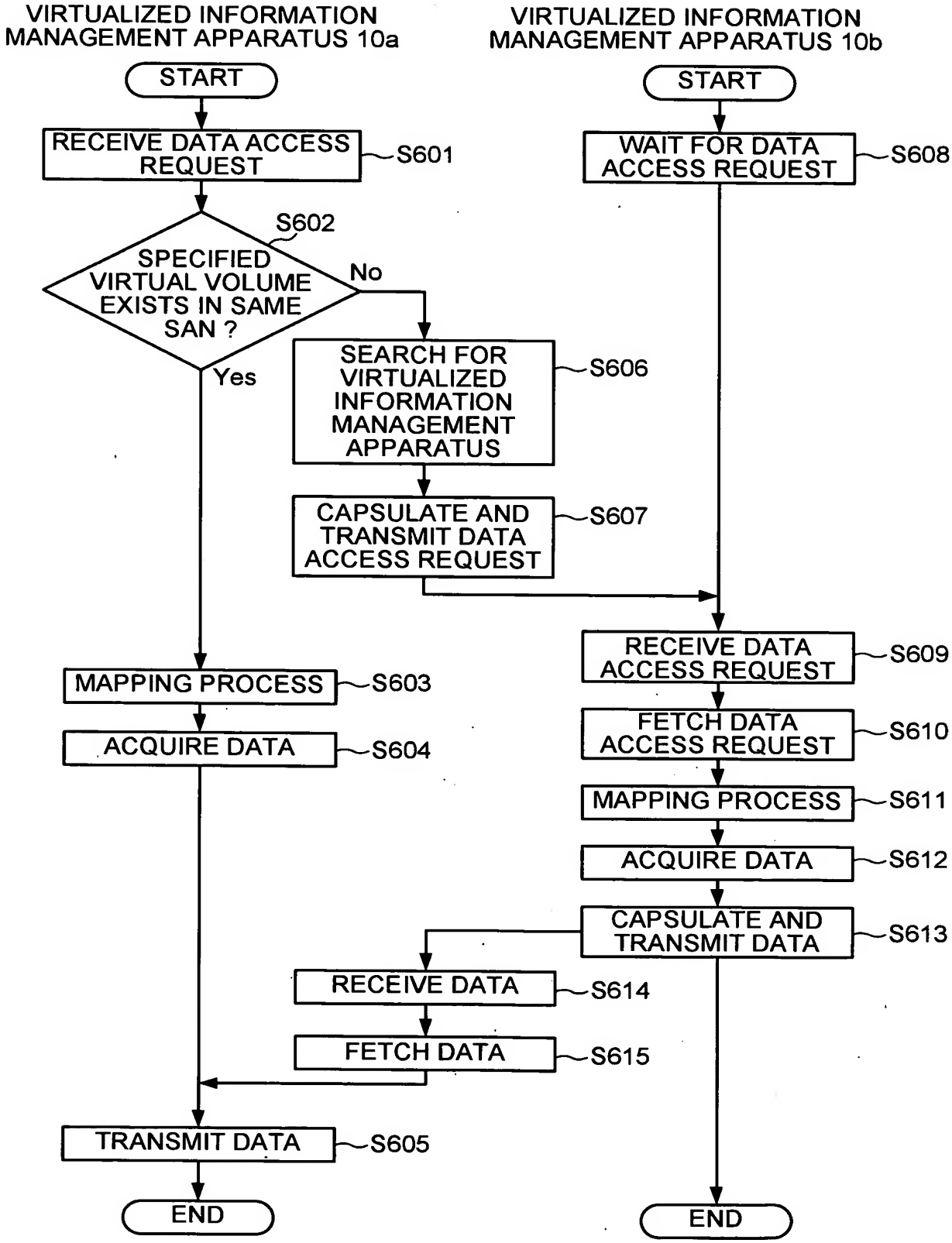

VIRTUALIZED INFORMATION MANAGEMENT APPARATUS 10a
START
RECEIVE DATA ACCESS REQUEST
S601
S602
SPECIFIED VIRTUAL VOLUME EXISTS IN SAME SAN ?
No
Yes
SEARCH FOR VIRTUALIZED INFORMATION MANAGEMENT APPARATUS
S606
CAPSULATE AND TRANSMIT DATA ACCESS REQUEST
S607
MAPPING PROCESS
S603
ACQUIRE DATA
S604
TRANSMIT DATA
S605
END
VIRTUALIZED INFORMATION MANAGEMENT APPARATUS 10b
START
WAIT FOR DATA ACCESS REQUEST
S608
RECEIVE DATA ACCESS REQUEST
S609
FETCH DATA ACCESS REQUEST
S610
MAPPING PROCESS
S611
ACQUIRE DATA
S612
CAPSULATE AND TRANSMIT DATA
S613
RECEIVE DATA
S614
FETCH DATA
S615
END

FIG.7

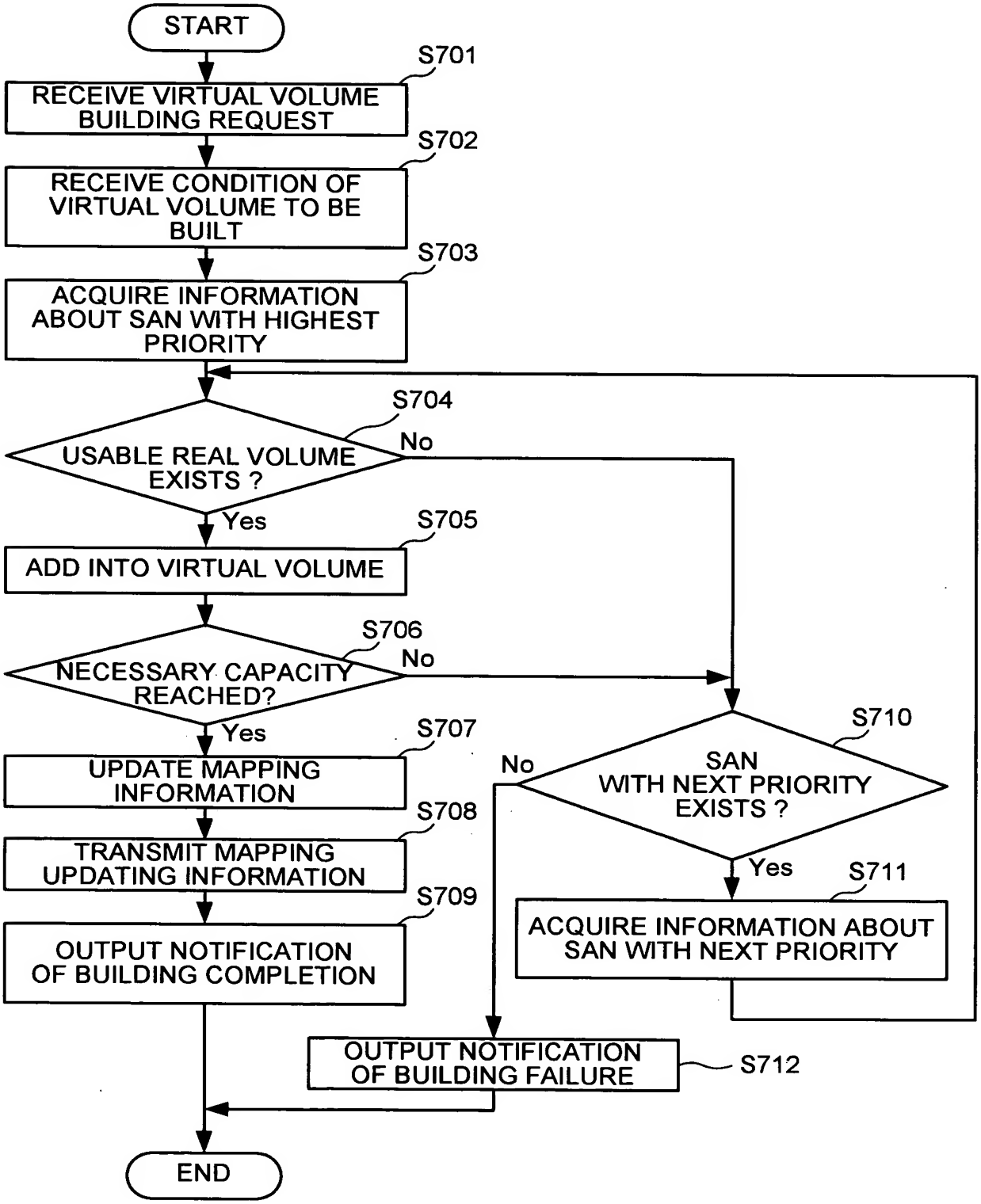
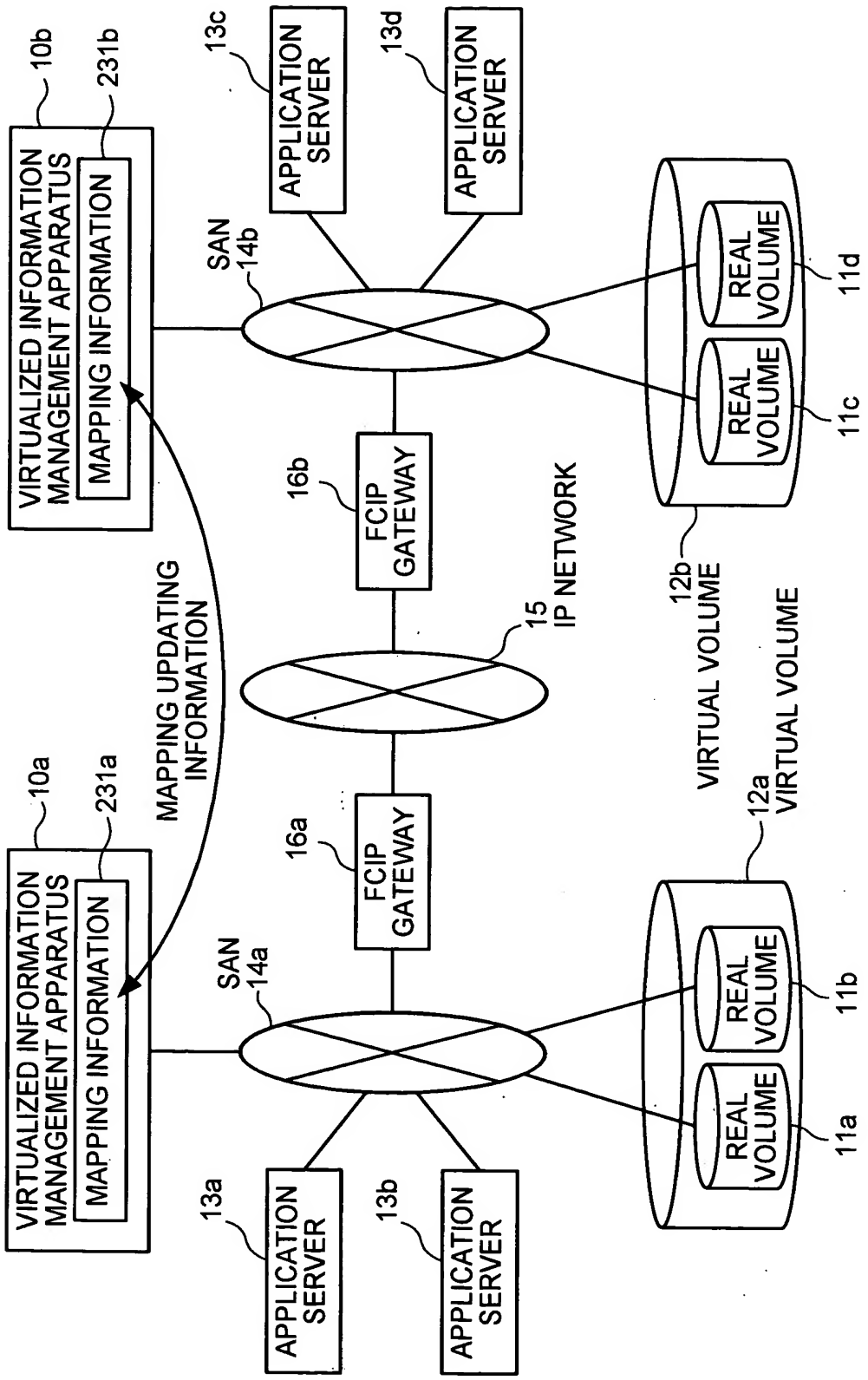

START
S701
RECEIVE VIRTUAL VOLUME BUILDING REQUEST
S702
RECEIVE CONDITION OF VIRTUAL VOLUME TO BE BUILT
S703
ACQUIRE INFORMATION ABOUT SAN WITH HIGHEST PRIORITY
S704
USABLE REAL VOLUME EXISTS ?
No
Yes
S705
ADD INTO VIRTUAL VOLUME
S706
NECESSARY CAPACITY REACHED?
No
Yes
S707
UPDATE MAPPING INFORMATION
S708
TRANSMIT MAPPING UPDATING INFORMATION
S709
OUTPUT NOTIFICATION OF BUILDING COMPLETION
S710
SAN WITH NEXT PRIORITY EXISTS ?
No
Yes
S711
ACQUIRE INFORMATION ABOUT SAN WITH NEXT PRIORITY
OUTPUT NOTIFICATION OF BUILDING FAILURE
S712
END

FIG.8


10b
231b
VIRTUALIZED INFORMATION MANAGEMENT APPARATUS
MAPPING INFORMATION
13c
APPLICATION SERVER
13d
APPLICATION SERVER
SAN
14b
REAL VOLUME
11d
REAL VOLUME
11c
16b
FCIP GATEWAY
15
IP NETWORK
12b
VIRTUAL VOLUME
MAPPING UPDATING INFORMATION
10a
231a
VIRTUALIZED INFORMATION MANAGEMENT APPARATUS
MAPPING INFORMATION
16a
FCIP GATEWAY
12a
VIRTUAL VOLUME
SAN
14a
REAL VOLUME
11b
REAL VOLUME
11a
13a
APPLICATION SERVER
13b
APPLICATION SERVER